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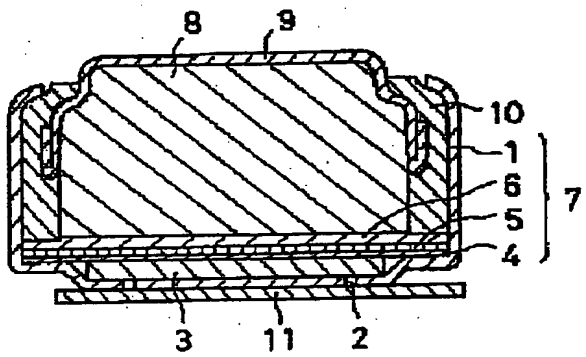
TITLE : NONAMALGAMATED AIR CELL



ABSTRACT : PROBLEM TO BE SOLVED: To provide a nonamalgamated air cell having excellent cell characteristics by improving flow performance of negative electrode active material and discharging utilization factor as nonamalgamation proceeds, and restricting deterioration of liquid leak resistance characteristics.

SOLUTION: A nonamalgamated air cell comprises a positive electrode case 1 having an air hole 2 in a bottom wall surface which is opened at one end, a positive electrode assembly 7 comprising a water repellent film 4, a catalyst layer 5, and a separator 6 laminated with each other, a gel negative electrode active material layer 8 including electrolyte and nonamalgamated zinc power disposed to face the separator 6, and an insulation gasket 10 disposed to be inserted between sealed parts of the negative electrode case 9 and the positive electrode case 1. The nonamalgamated zinc powder in the negative electrode active material 8 is that having a bulk density of 2.6-3.1g/ml, and an electrolyte ratio of 20-100%, that having a bulk density of 3.1-3.5g/ml, and an electrolyte ratio of 60-100%, or that having a bulk density of 3.5-3.8g/ml, and an electrolyte ratio of 80-100%, thereby deterioration of flow performance, a discharging utilization factor, and leak resistance characteristics in charging the negative electrode active material 8 can be restricted to provide a nonamalgamated air cell having excellent cell performance.

APPENDIX I

Calculation of the necessary space for the electrolyte in batteries according to JP Publ. 10162869/Toshiba

Bulk density of zinc	weight electrolyte	volume zinc/ml	volume electrolyte
(g/ml)	(20 weight %)	(1:7 ml per ml)	(1:1,37 ml per ml)
2,61	0,522	0,3729	0,3810
space in ml mixture for electrolyte		0,6271	too much
3.09	0.618	0.4414	0.3810
space in ml mixture for electrolyte		0.5586	too much
	(40 weight %)		
2,61	1,044	0,3729	0,7620
space in ml mixture for electrolyte		0,6271	too little
3.09	1,236	0,4414	0.9022
space in ml mixture for electrolyte		0,5586	too little
	(60 weight %)		
2,61	1,566	0,3729	1.1430
space in ml mixture for electrolyte		0,6271	too little
3,09	1,854	0,4414	1,3533
space in ml mixture for electrolyte		0,5586	too little
3,51	2,106	0,5014	1,5372
space in ml mixture for electrolyte		0,4986	too little

From the above figures can be seen, that non the examples fulfills the parameter that the volume of electrolytic medium is equal the volume of the dry packing of the zinc and/or zinc alloy particle.

Using 20 weight % electrolyte remains much space for air. By using 40 weight % or more electrolyte is not sufficient space between the particle. Therefore this excess has to be fixed by a gelling agent.

APPENDIX II